Leica SP1600

Saw Microtome

Instruction Manual

Leica SP1600 – Saw Microtome
V1.1 English - 12/03
Always keep this manual near the instrument!
Read carefully prior to operating the instrument!

Leica
MICROSYSTEMS

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Leica reserves the right to change technical specifications as well as manufacturing processes without prior notice. Only in this way is it possible to continuously improve the technology and manufacturing techniques used in our products.

For the instrument serial number and year of manufacture, please refer to the name plate at the back of the instrument.

Leica MICROSYSTEMS

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Serial No. .....

Year of manufacture .....

Manufactured in: .. Federal Republic of Germany

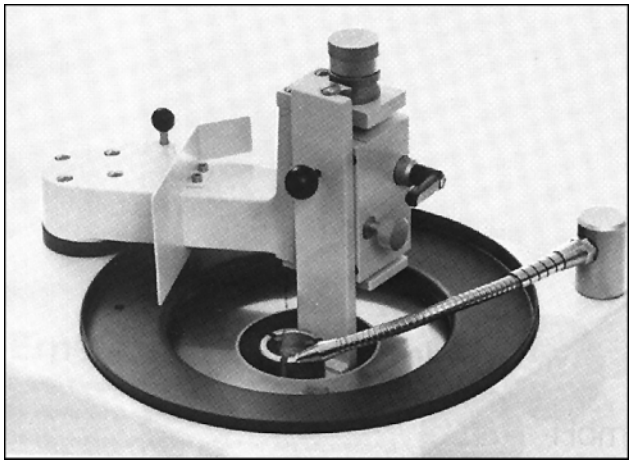
1. Preliminary remarks

The Leica SP1600 Saw Microtome is specifically for "cutting" extremely hard and brittle materials such as bone, ceramics and reinforced plastics. The sawing method used prevents deformations in the sections.

The heart of the microtome is the diamond-coated innerhole saw. An annular frame makes it excellently stable although it is only 300 µm thick. To make a section, the object holder is guided extremely slowly against the saw rotating at a speed of approx. 600 rpm.

The built-in water cooling device prevents overheating of the object and removes sawdust from the cutting edge. It also prolongs the life of the saw blade. The amount of water is regulated with a valve. The section thickness is set manually with a knurled screw on the object arm.

Fig. 1 Leica SP1600 Saw Microtome



2. Installation and assembly

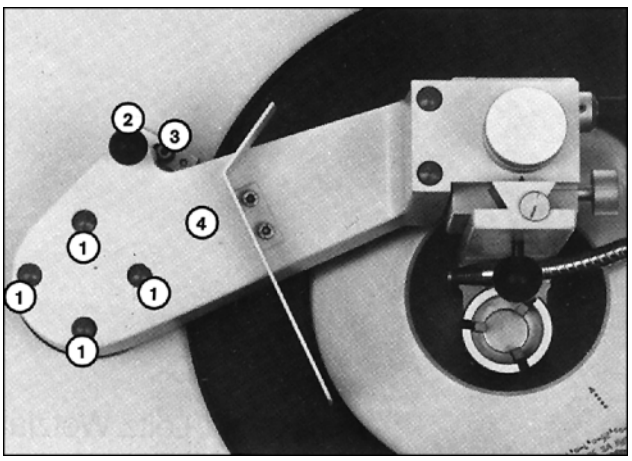
It is important to place the saw microtome on a stable bench. Water supply and drainage facilities must be nearby (length of pipes approx. 2 meters.)

2.1 Attaching the object arm

Pull out the clamp pin (**2.2**) and attach the object arm (**2.4**). It is correctly located when in the position for screwing over the saw (see Fig. 2). Insert the corresponding Allen screws (**2.1**), tighten with the supplied Allen key (4 mm) and mount the plastic covers. Press the object arm back into the starting position, the clamp pin (**2.2**) locks into place. Tighten the screw (**2.5**).

Fig. 2

1 Allen screws to secure the object arm
2 Object arm clamp
3 Stop bar for the clamp
4 Object arm



2.2 Connection to the water supply

Attach the plastic cover (**3.2**).

Push the red pressure pipe (**3.8**) onto the valve (**3.4**) and fix with the corresponding clip. The pressure pipe has an internal diameter of approx. 1 cm. With the appropriate adapter it can be affixed to any water tap.

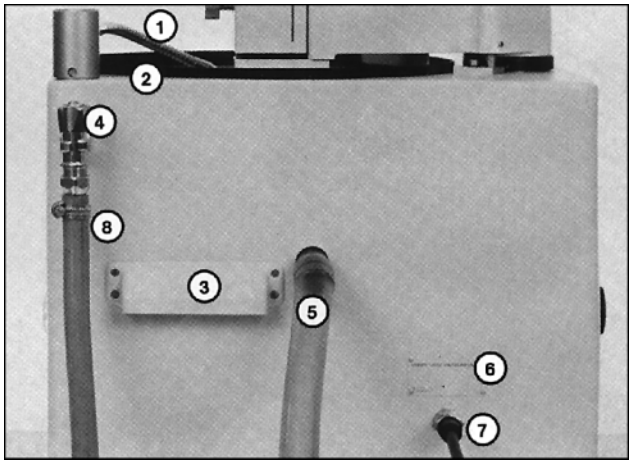
Attach the drainage pipe (**3.5**) to the instrument as shown in the diagram and guide the other end to a water basin. The end of the pipe leading into the basin must be at least 30 cm lower than the end connected to the microtome.

2.3 Connection to the mains

The saw microtome is now ready for operation. It is available for connection to a mains voltage of 230V 50Hz or 120V 60 Hz.

Fig. 3

1 Nozzle
2 Plastic cover
3 Motorized ventilation
4 Valve for regulation of water flow
5 Drainage pipe
6 Model plate
7 Mains cable
8 Pressure pipe leading to water supply



3. Operation

3.1 Mounting the object

The object mount (**4.2**) has a stage area of 6 to 30 mm. Objects with sizes within this range can be mounted directly and secured with the knurled wheel. Smaller or larger objects are first cemented to plates with 2-component adhesive.

Pick up the object holder by the knob (**4.4**) and insert into the corresponding guide on the object arm (**5.2**). For this, the object arm must be fixed in the back position (see under **2.1**). Tighten the knurled screw (**5.1**).

Turn the knurled screw for the section thickness setting (**5.4**) to the right until the object holder is in its lowest position.

3.2 Setting the height of the object

Loosen the knurled screw (**5.1**), take hold of the knob (**4.4**) and pull out the object holder until the surface of the object is slightly above the upper edge of the saw. Tighten the knurled screw (**5.1**). Clamp the section thickness setting with the lever (**5.5**).

Fig. 4 Universal joint clamp

1 Object holder
2 Object mount
3 Knurled wheel to secure the object
4 Knob for holding
5 Plate with object cemented on

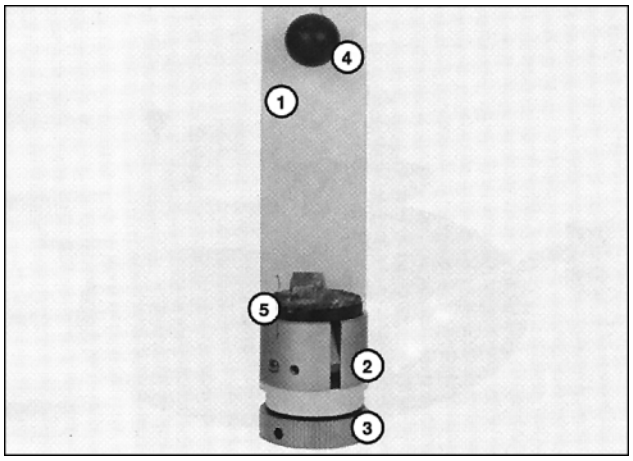
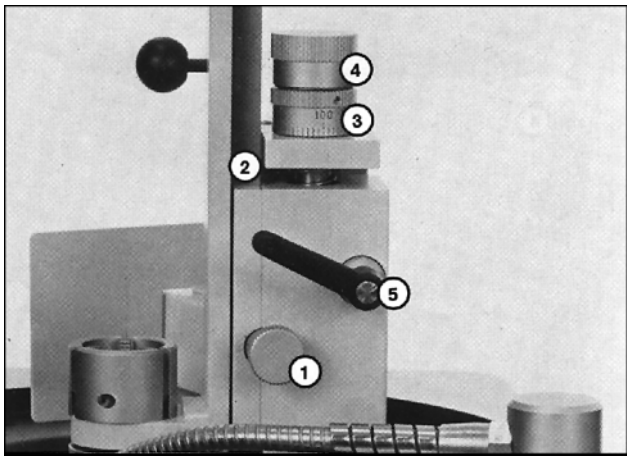


Fig. 5

1 Knurled screw to secure the object holder
2 Sliding guide for the object holder
3 Scale ring for zero setting
4 Knurled screw for setting section thickness
5 Clamp for section thickness setting



3.3 Trimming the object surface

Turn on the water tap and adjust the water flow with the valve (**3.4**). Align the nozzle (**3.1**) so that the water jet lands on the edge of the saw blade. Turn on the motor with the switch (**6.1**). Unclamp the object by pulling the stop pin (**2.2**).

To save time, the speed of the object feed can be increased while the object is guided towards the edge of the blade. To do this, turn the knurled knob (**7.1**) clockwise.

The object must not meet the saw blade at maximum speed. Shortly before contact is made, turn the knurled knob (7.1) back to the speed necessary for sawing.

The figures engraved on the knurled knob (**7.1**) are not absolute speed values, but only guidelines to enable repeat settings.

The most favorable feed rate must be determined for each individual object. As a general rule, however, the following applies: the lower the speed, the less the forces coming to bear on object and saw blade, i. e. the gentler the sawing process will be.

3.4 Making the section

After the object has passed through the saw, turn the object arm (2.4) back as far as it will go. It clicks into place audibly. Press the switch (**6.1**) to turn off the motor. Remove the section from the blade.

Fig. 6 Mains switch

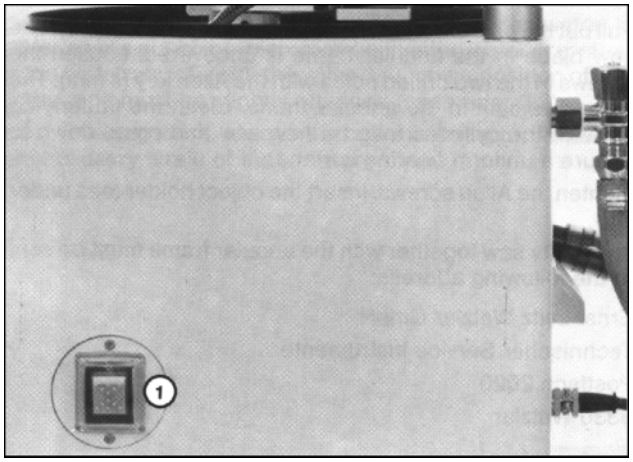
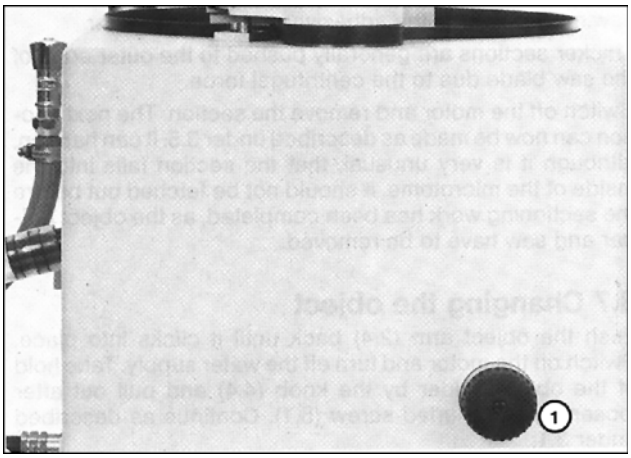


Fig. 7 Knurled knob for object feed



3.5 Setting the section thickness

Unclamp the lever (**5.5**). First set the scale ring (**5.3**) to 0 (a height adjustment is not yet made). To set the section thickness, turn the knurled knob (**5.4**) anticlockwise. Every division on the scale represents 10 µm. Clamp at the chosen thickness with the lever (**5.5**).

When setting section thickness, the thickness of the saw blade (approx. 300 µm) must always be taken into account. For example, a setting of 400 µm is necessary to obtain a 100 µm thick section.

Switch on the motor. Then release the object arm clamp (**2.2**). Set the feed to the maximum rate until the object has almost reached the saw blade. Use a slower speed for cutting (see under **3.3**).

The water cooling device is imperative for the sawing process.

3.6 Removing the section

If the section is relatively thin, it will stick to the blade after sawing because of the adhesive power of the water.

Thicker sections are generally pushed to the outer edge of the saw blade due to the centrifugal force.

Switch off the motor and remove the section. The next section can now be made as described under **3.5**. It can happen, although it is very unusual, that the section falls into the inside of the microtome. It should not be fetched out before the sectioning work has been completed, as the object holder and saw have to be removed.

3.7 Changing the object

Push the object arm (**2.4**) back until it clicks into place. Switch off the motor and turn off the water supply. Take hold of the object holder by the knob (**4.4**) and pull out after loosening the knurled screw (**5.1**). Continue as described under **3.1**.

4. General information

Due to the thin blade of the inner-hole saw, incorrect handling can very soon lead to damage of the edge (e. g. deformation), making it impossible to produce thin sections.

Even an extremely high feed rate, especially at the moment when the object makes contact with the rotating saw, can result in premature wear or damage to the saw.
As a general rule, the slower the feed rate, the longer the life of the saw blade, which also depends on the type of object. It is not possible to repair the saw when defect; it must be replaced. The following are symptoms suggesting that the saw blade is no longer working properly and must be replaced:
The object takes considerably longer to pass through the blade (using the same object and same feed rate).
The blade “jumps” out of the object (object only partially cut).
The edge of the saw is smooth (no diamond coating left).
The saw rotation is no longer exactly circular.
If these factors are noticed the saw blade must be replaced as follows:
Pull out the object holder. Remove the plastic cover (**3.2**). The saw blade in the annular frame is uncovered. Loosen the screws in the two drilled holes with the Allen key (4 mm). The screws remain in the annular frame. Clean the underlying parts of the cylinder. Insert a new saw and press down to ensure a uniform bearing surface.
Tighten the Allen screws. Insert the object holder (see under **3.1**).
The faulty saw together with the annular frame must be sent to the following address:

Leica Microsystems Nussloch GmbH
Heidelberger Str. 17-19
69226 Nussloch
Germany

5. Maintenance and cleaning

Framing and adjustment can only be done in our factory, as only here are the optical checking facilities available for the exact alignment of concentricity. It is therefore a good idea to have two complete saws.

The attainable section thickness depends on various factors:

- Type of object - The harder and more homogeneous the object, the thinner the section attainable.
- Quality of the saw's condition
- Feed rate - The slower the feed rate, the thinner the section attainable.
- Object size - As already experienced with other microtomes, the smaller the diameter of the object, the thinner the sections that can be obtained.

Under the most favourable conditions, section thicknesses of approx. 30 µm can be achieved. For most objects, the optimal thickness is 80 -100 µm. This applies principally to synthetic-resin embedded undecalcified bone.

High water pressure is not necessary for cooling the object. It is sufficient to rinse the object and blade with the water. If water spurts out of the microtome, either the water pressure is too high (regulate with the valve **3.4**), or the position of the water pipe must be slightly changed (see under **3.3**).

After finishing work, always turn off the water tap to avoid unnecessary strain of the pressure pipe.
The sliding guide (**5.2**) should be greased with Vaseline from time to time (depending on frequency of use, every three or six months). The inner part of the saw should be cleaned now and again, as sawdust and waste material build up here and can block the drainage pipe.

The saw itself is rustproof and needs no special care.

Warranty

Leica Microsystems Nussloch GmbH vouches for the fact that the delivered product underwent comprehensive quality control based on its strict internal testing criteria and is free of defects, and guarantees that all technical specifications and/or warranty of qualities was met.

The scope of the warranty is based on the content of the concluded agreement. The warranty terms of your Leica sales organization or the organization from which you have purchased the contractual product shall apply exclusively.

Service information

If you are in need of technical customer service or spare parts, please contact your Leica representative or the Leica dealer where you purchased the unit.

The following unit-related information is required:

- Model designation and serial number of the unit
- Location of the unit and a contact person
- Reason for customer service request
- Delivery date

Shutdown and disposal of the instrument

The unit or parts of the unit must be disposed of according to existing local applicable regulations.